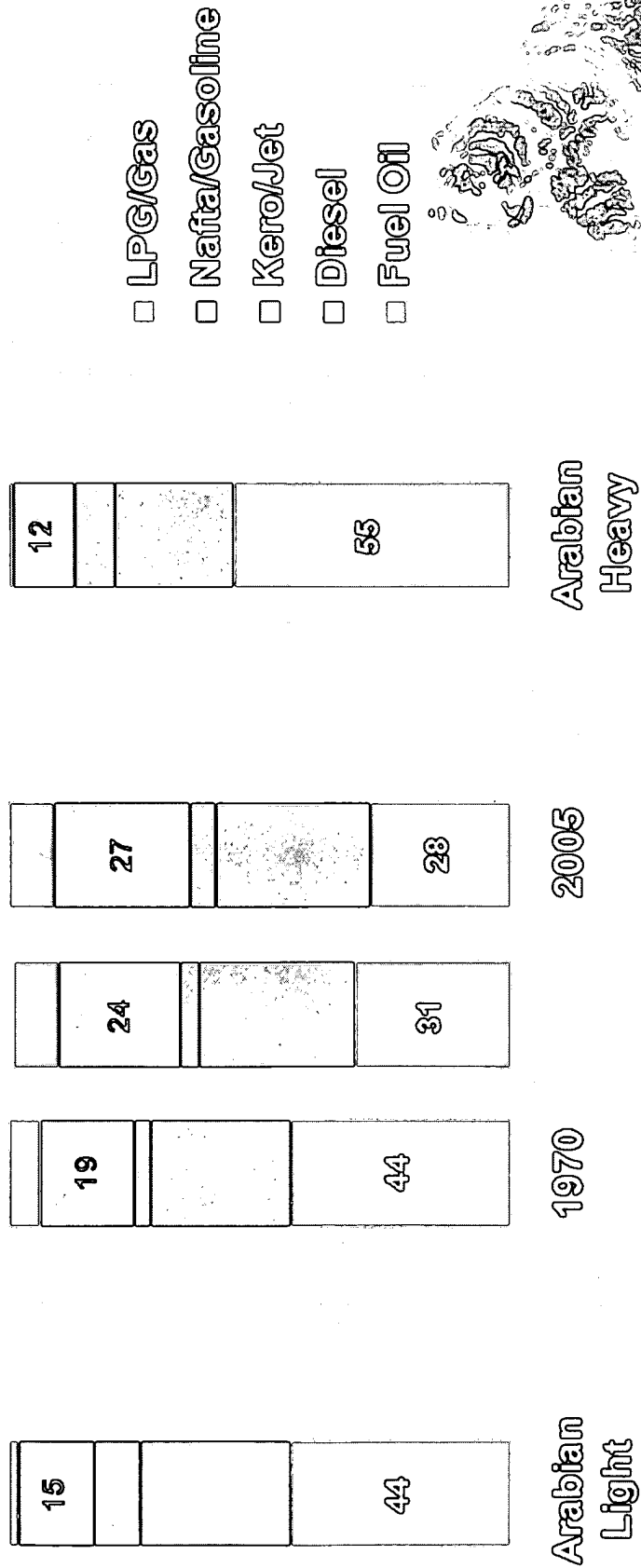
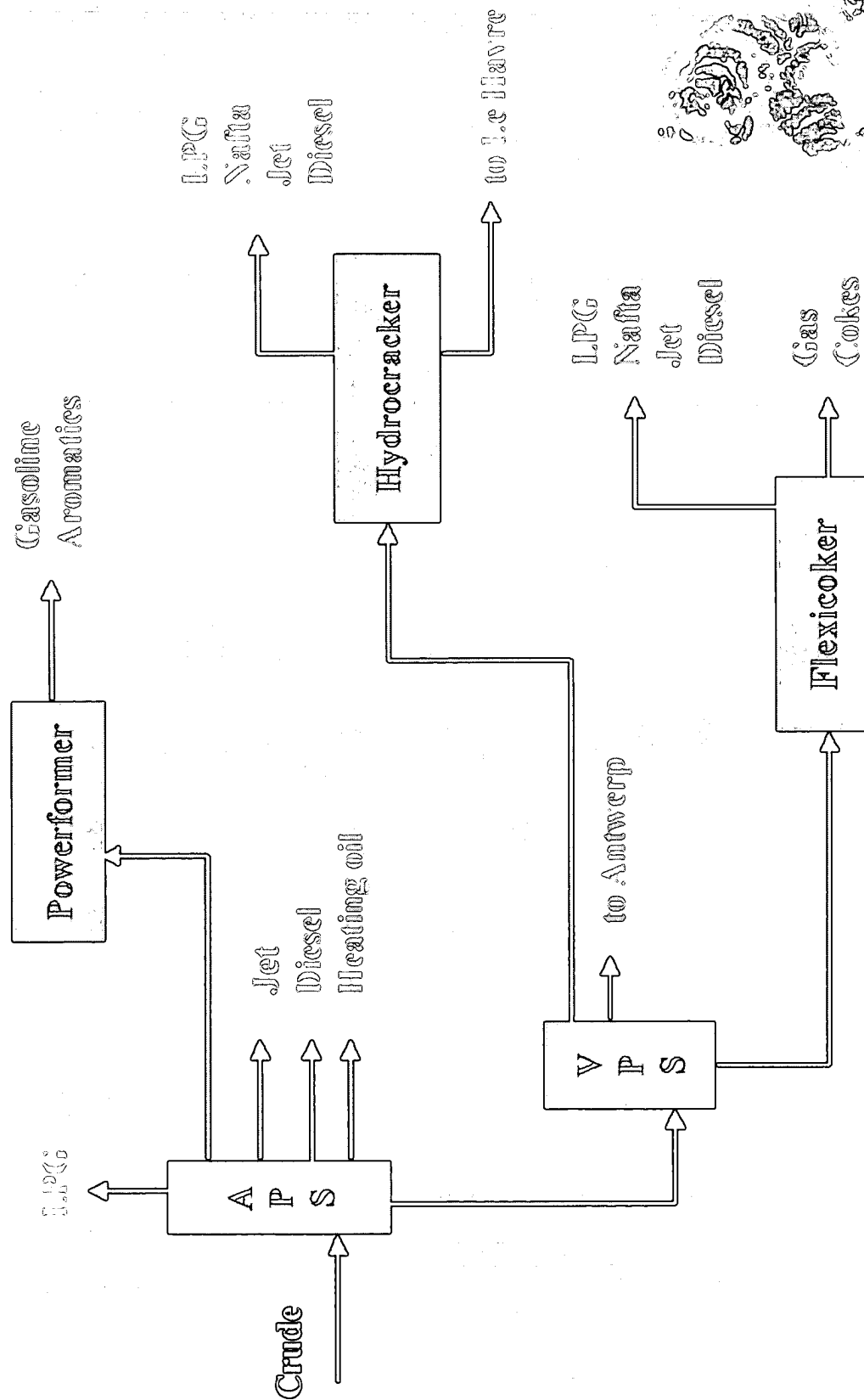


# Market demand and crude oil supply



# Esso Rotterdam Refinery



# Vacuum Residue Conversion Processes

## Considerations:

- Market demands for light products
- Environmental legislation for cleaner products
- Stricter regulations on refinery emissions
- Vacuum residue contains a lot of carbon and little hydrogen but also 3-5% sulphur, nitrogen and metals like vanadium and nickel



# Vacuum Residue Conversion Processes

## Two routes for vacuum residue conversion :

- Hydrogen addition processes : Residfining, Hycon
  - ◇ high temperature, high hydrogen pressure
  - ◇ rapid catalyst deactivation requires large reactors or moving catalyst
  - ◇ sensitive for metal contaminants
  - ◇ products do not need any further treating
  
- Carbon rejection by thermal cracking : Delayed Coking, FLUID and FLEXICOKING
  - ◇ high temperature, low pressure, no hydrogen
  - ◇ no catalyst, abundant coke
  - ◇ insensitive to contaminants
  - ◇ low refinery SO<sub>2</sub> emissions
  - ◇ products need after treatment in conventional hydrogeners



# Flexicokers

All build 1980 - 1990, investment > 1 billion \$\$

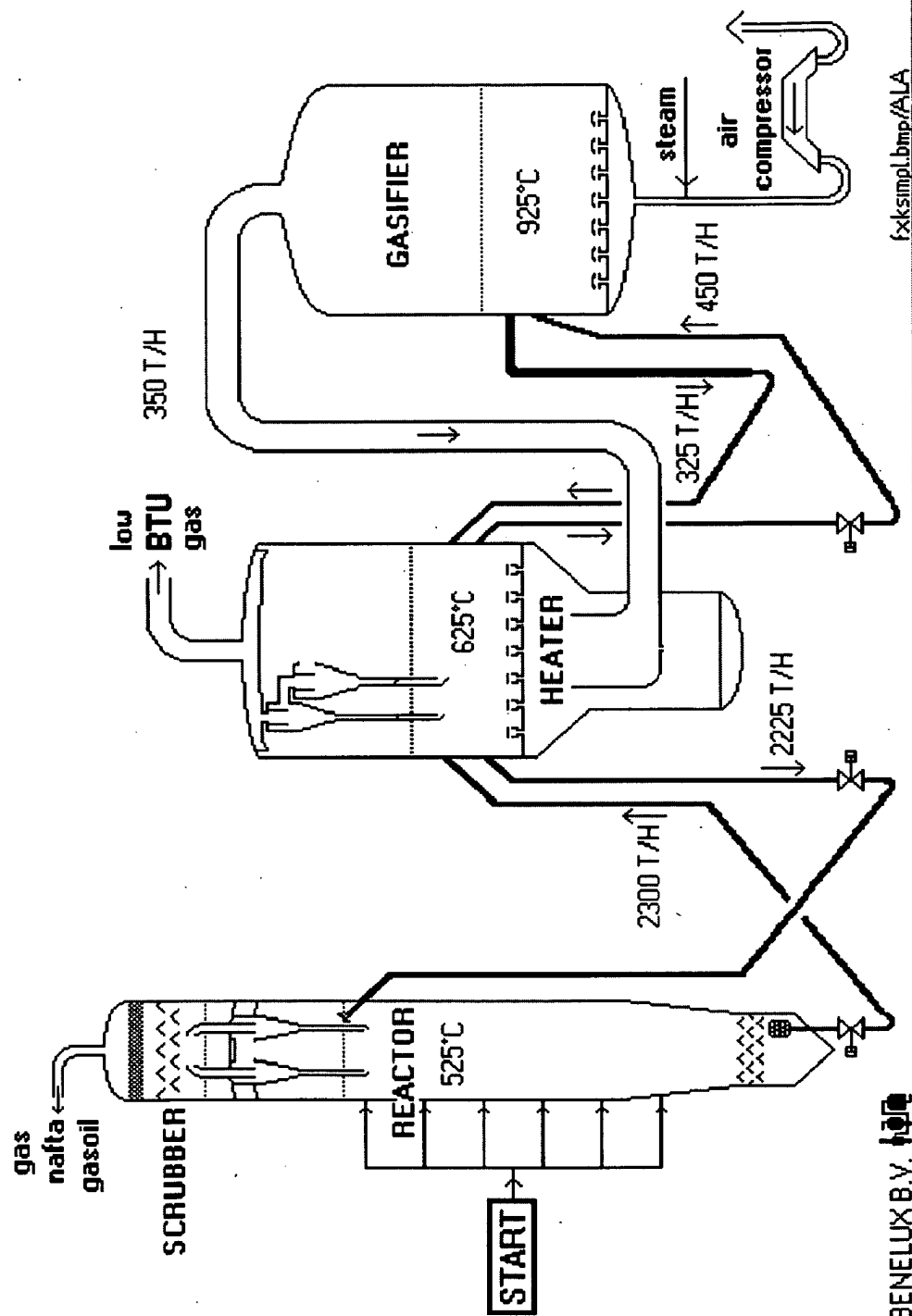
Rotterdam	NL	ExxonMobil
Baytown	USA-Tx	ExxonMobil
Martinez	USA-Ca	Shell
TOA	Japan	State-owned
Amuay	Venezuela	State-owned

Why only 5 Flexicokers in the world ?

- ◇ Initial investment
- ◇ Mechanical cost (mainly in Turnaround)
- ◇ Runlength



# SIMPLIFIED FLEXICOKER PROCESS



ESSO-BENELUX B.V.

fxksimol.bmp/ALA

